

STRUCTURAL STEEL POST FOR GROUND MOUNTED SIGNS											
POST DES. NO.*	NOM SIZE	TORQUE AND HIGH STRENGTH BOLTS	BASE CONNECTION DATA TABLE (mm)								
			A	B	C	D	E	F	G	W	R
1	W150x13	16 mm ROUND x 70 mm 39 Nm	128	51	32	70	29	19	13	6	9
2	W150x22										
3	W200x27										
4	W250x33	19 mm ROUND x 90 mm 63 Nm	153	57	35	89	32	25	19	8	10
5	W250x39										
6	W310x39										

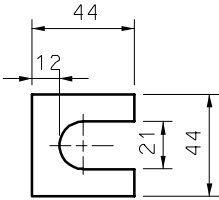
POST AND FOOTING DATA TABLE												
POST DES. NO.*	NOM. SIZE (mm)	MASS kg/m	STUB LENGTH (mm)	DIA. (mm)	LEVEL GROUND		1:6 GRADE		1:4 GRADE		1:2 OR 1:3 GRADE	
					DEPTH (m)	m³	DEPTH (m)	m³	DEPTH (m)	m³	DEPTH (m)	m³
1	W150	13	610	380	915	0.11	965	0.12	990	0.13	1065	0.13
2	W150	22	760	610	1220	0.36	1270	0.38	1295	0.39	1370	0.41
3	W200	27	760	710	1370	0.54	1420	0.56	1445	0.57	1525	0.60
4	W250	33	915	915	1525	1.00	1575	1.04	1600	1.06	1675	1.11
5	W250	39	915	915	1525	1.00	1600	1.05	1650	1.09	1755	1.16
6	W310	39	915	915	1675	1.10	1755	1.16	1805	1.19	1905	1.26

SHEET METAL BOLT RETAINER CUT FROM 0.39 mm GALVANIZED SHEET METAL. PLACE BETWEEN BASE PLATES. SIZE VARIES TO FIT PLATE. BOLT HOLES TO BE 2 mm LARGER THAN REQUIRED BOLT SIZE.

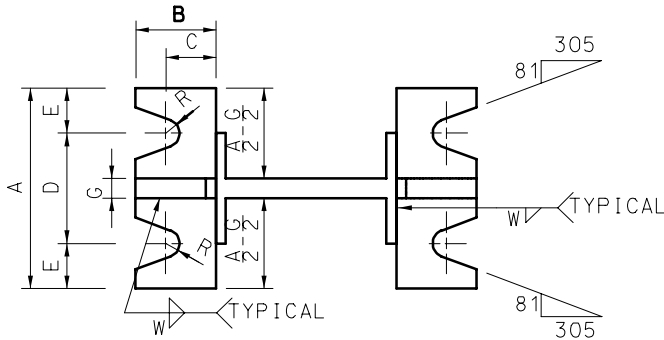


BOLT RETAINER

\* FOR POST DESIGNS NUMBERS 3, 4, 5 AND 6 HAVING WEIGHTS GREATER THAN 27 kg/m., POSTS SHALL BE SPACED AT LEAST 2.1 m APART. FOR POST DESIGNS NUMBERS 1 AND 2, POSTS MAY BE SPACED LESS THAN 2.1 m APART. DO NOT USE THREE NUMBER 1 OR 2 POSTS WITH A SIGN WIDTH OF LESS THAN 3.15 m.

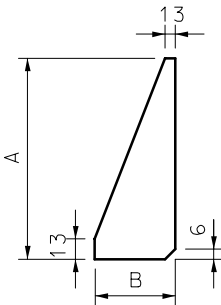


SHIM

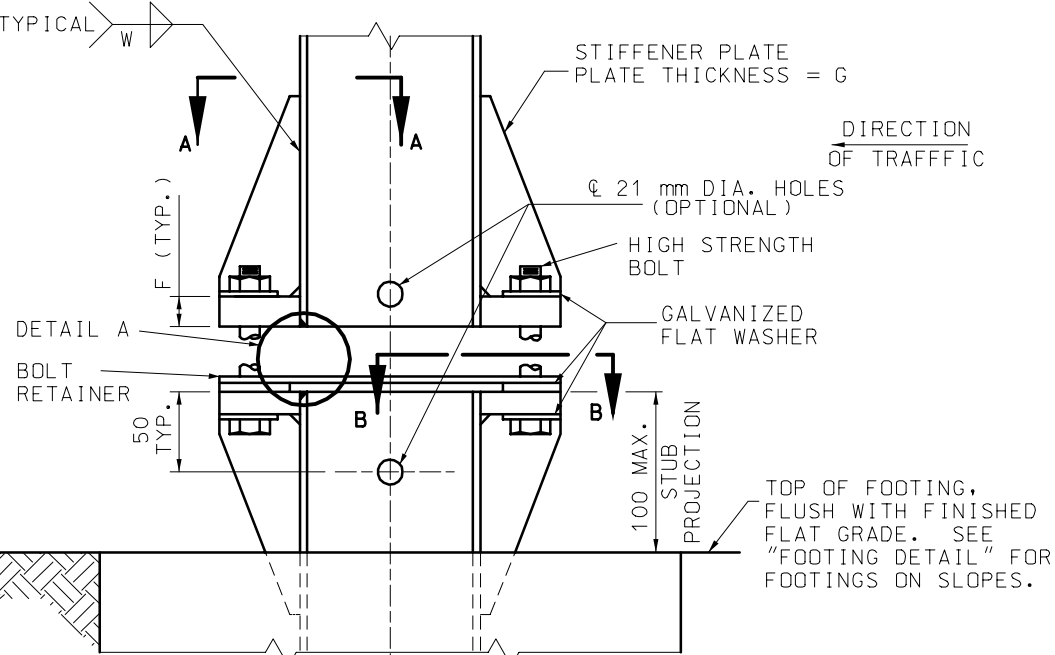


SECTION A-A

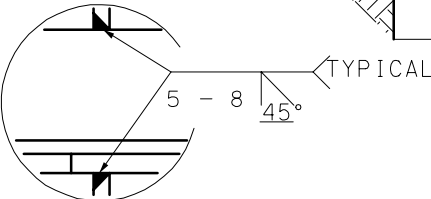
SECTION B-B  
POST AND FOOTING



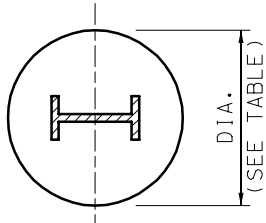
STIFFENER PLATE



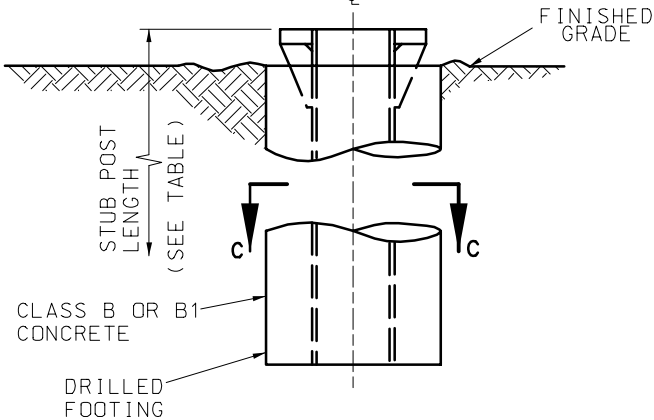
ELEVATION



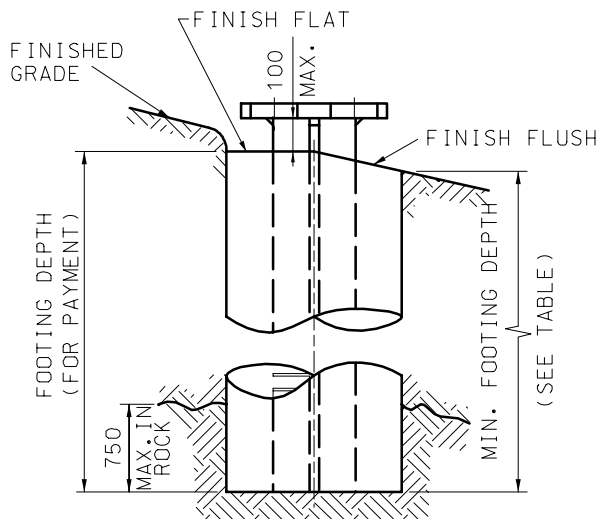
DETAIL A



SECTION C-C



STUB DETAIL



FOOTING DETAIL

GENERAL NOTES:

ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE NOTED.

DESIGN SPECS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS. LUMINAIRES AND TRAFFIC SIGNALS – 1985.

POSTS TO BE GALVANIZED AFTER FABRICATION.

METAL PROJECTING BEYOND THE PLANE OF THE PLATE FACE WILL NOT BE ALLOWED.

REMOVE ALL GALVANIZING RUNS OR BEADS IN THE WASHER AREA.

ALL STRUCTURAL STEEL STIFFENER PLATES AND BASE PLATES, FOR GROUND MOUNTED SIGNS SHALL MEET THE REQUIREMENTS OF ASTM A 36 OR AASHTO M 223 345 MPa, OR AASHTO 222, MINIMUM YIELD 345 MPa.

IN THE EVENT THE DISTANCE BETWEEN THE TOP OF THE FOOTING AND THE HINGE POINT IS LESS THAN 2.1 m, THE SIGN HEIGHT AND POST LENGTH IS TO BE INCREASED SUFFICIENTLY TO ACCOMMODATE THIS MINIMUM SPACING.

HINGE PLATES NOT REQUIRED ON SINGLE POST SIGNS OR ANY SIGNS USING PIPE POSTS.

NUTS ON HINGE PLATE BOLTS SHALL BE TIGHTENED TO THE REQUIRED MINIMUM BOLT TENSION VALUES SHOWN IN TABLE 1 SEC. 1080 OF THE STANDARD SPECIFICATIONS.

THE NUT SHALL BE FREE RUNNING. IF THE NUT WILL NOT SPIN ON THE BOLT BECAUSE OF GALVANIZING IRREGULARITIES, A LUBRICANT SHALL BE APPLIED.

ALL BREAKAWAY ASSEMBLY BOLTS SHALL BE TIGHTENED IN A SYSTEMATIC MANNER TO THE PRESCRIBED TORQUE SHOWN ON THIS DRAWING.

EACH BREAKAWAY ASSEMBLY BOLT SHALL BE LOOSENED AND RE-TIGHTENED TO THE REQUIRED TORQUE IN THE SAME ORDER AS THE INITIAL TIGHTENING.

THE THREADS SHALL BE BURRED AT THE NUT USING A CENTER PUNCH TO PREVENT NUT FROM LOOSENING.

POST LENGTH QUANTITY SHOWN ON PLANS INCLUDES STUB.

13 mm X 65 mm HIGH STRENGTH. BOLTS FOR PIPE POSTS SHALL BE OF THE DESIGNATION AASHTO M 164 OR ASTM A449. ALL OTHER H.S. BOLTS SHALL BE OF THE DESIGNATION AASHTO M 164.

FURNISH TWO 0.3 mm± AND TWO 0.08 mm± THICK SHIMS PER POST FROM BRASS SHIM STOCK OR STRIP, DESIGNATION ASTM B 36. SHIM AS REQUIRED TO PLUMB POST.

HIGH STRENGTH BOLTS WITH HEX NUT AND THREE WASHERS WITH EACH BOLT ARE TO BE GALVANIZED.

OPTIONAL HOLES (21 mm ROUND FOR "I" SHAPE POSTS AND 14 mm ROUND FOR PIPE POST BASE PLATES) AS SHOWN IN "ELEVATIONS" ARE TO BE USED AS AID FOR GALVANIZING ONLY.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
HIGHWAY SIGNING BREAKAWAY ASSEMBLIES FOR GROUND MOUNTED SIGNS			
DATE: _____	EFFECTIVE: 07-01-2004	M903.03AY	1/8

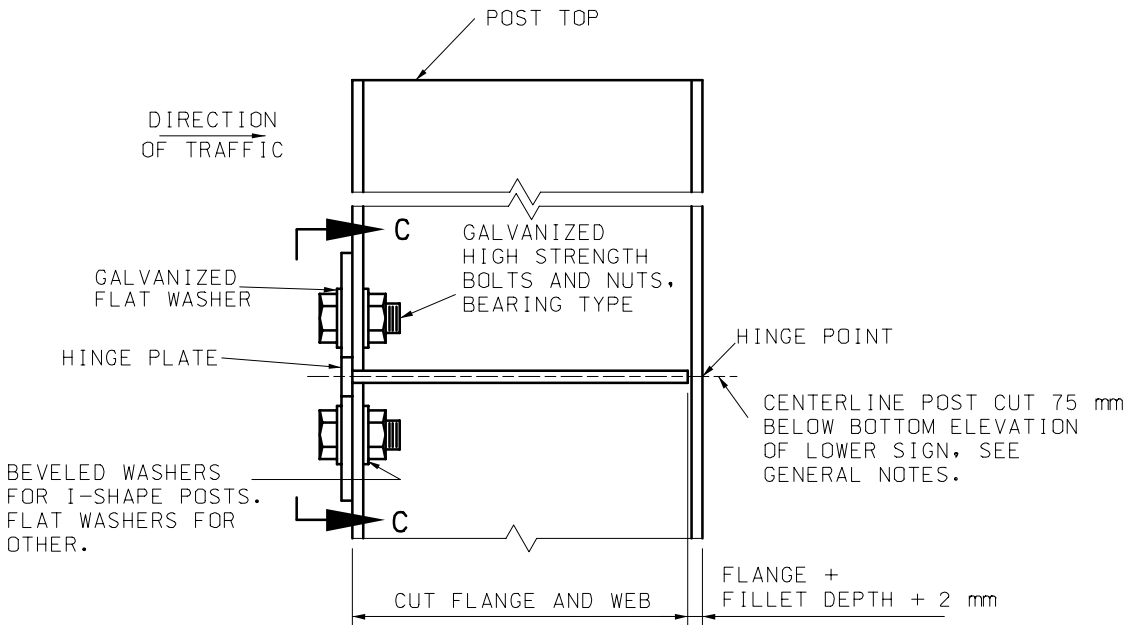
WIDE FLANGE STRUCTURAL STEEL POSTS DESIGN DATA

POST DES. NO.	NOM. SIZE (mm)	MASS kg/m	(mm)	(mm)	(mm)	(mm)
1	W150	13	150	100	5.5	4.32
2	W150	22	152	152	6.6	5.84
3	W200	27	207	133	8.4	5.84
4	W250	33	258	146	9.1	6.10
5	W250	39	262	147	11.2	6.60
6	W310	39	310	165	9.7	5.84

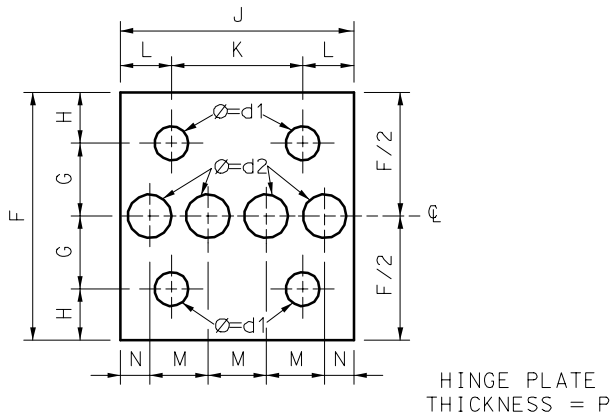
THE WEIGHT OF STRUCTURAL STEEL POSTS SHOWN IN THE CONTRACT HAS BEEN COMPUTED USING THE WEIGHTS SHOWN.

HINGE PLATE DATA TABLE

POST DESIGN NO.	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	N (mm)	d1 (mm)	d2 (mm)	P (mm)	BOLT DIA. (mm)	MASS (EA.) (kg)
1	108	25	29	102	57	22	25	13	14	19	5	13	0.34
2	127	32	32	152	89	32	38	19	17	32	6	16	0.76
3	127	32	32	133	70	32	32	19	17	27	6	16	0.68
4	152	38	38	146	70	38	35	21	21	29	8	19	1.14
5	152	38	38	146	70	38	35	21	21	29	8	19	1.14
6	152	38	38	165	89	38	41	21	21	33	8	19	1.27



ELEVATION  
HINGE PLATE DETAIL



ALL HOLES SHALL BE DRILLED. ALL PLATE CUTS SHALL PREFERABLY BE SAW CUTS. HOWEVER: FLAME CUTTING WILL BE PERMITTED PROVIDED ALL EDGES ARE GROUND.

HINGE PLATE SHALL BE FABRICATED FROM ASTM A 36 STRUCTURAL STEEL.

ELEVATION C-C

GENERAL NOTE:

ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE NOTED.

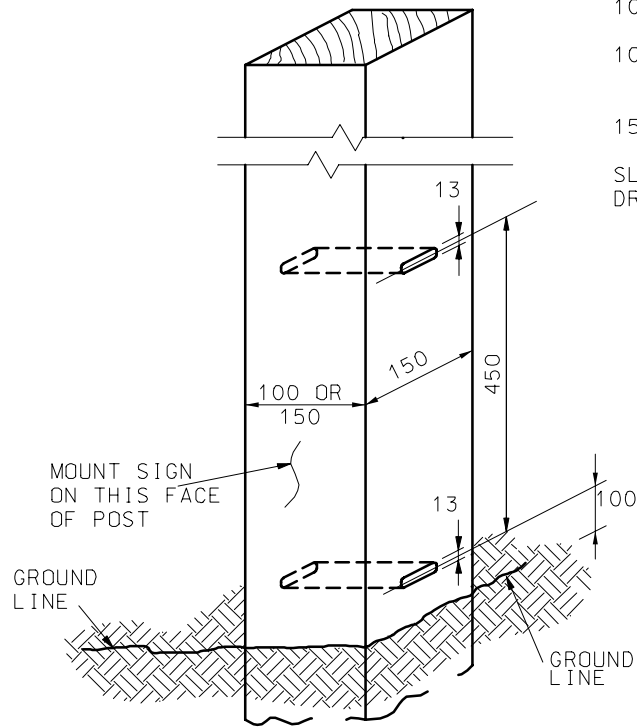
MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

**HIGHWAY SIGNING**  
**BREAKAWAY ASSEMBLIES FOR**  
**GROUND MOUNTED SIGNS**

DATE: \_\_\_\_\_

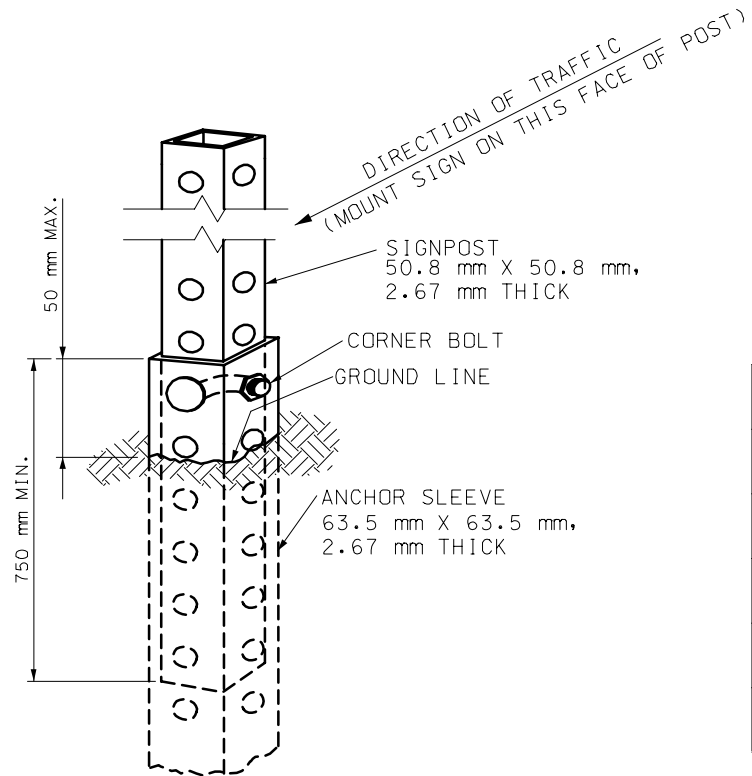
EFFECTIVE: 07-01-2004

**M903.03AY**



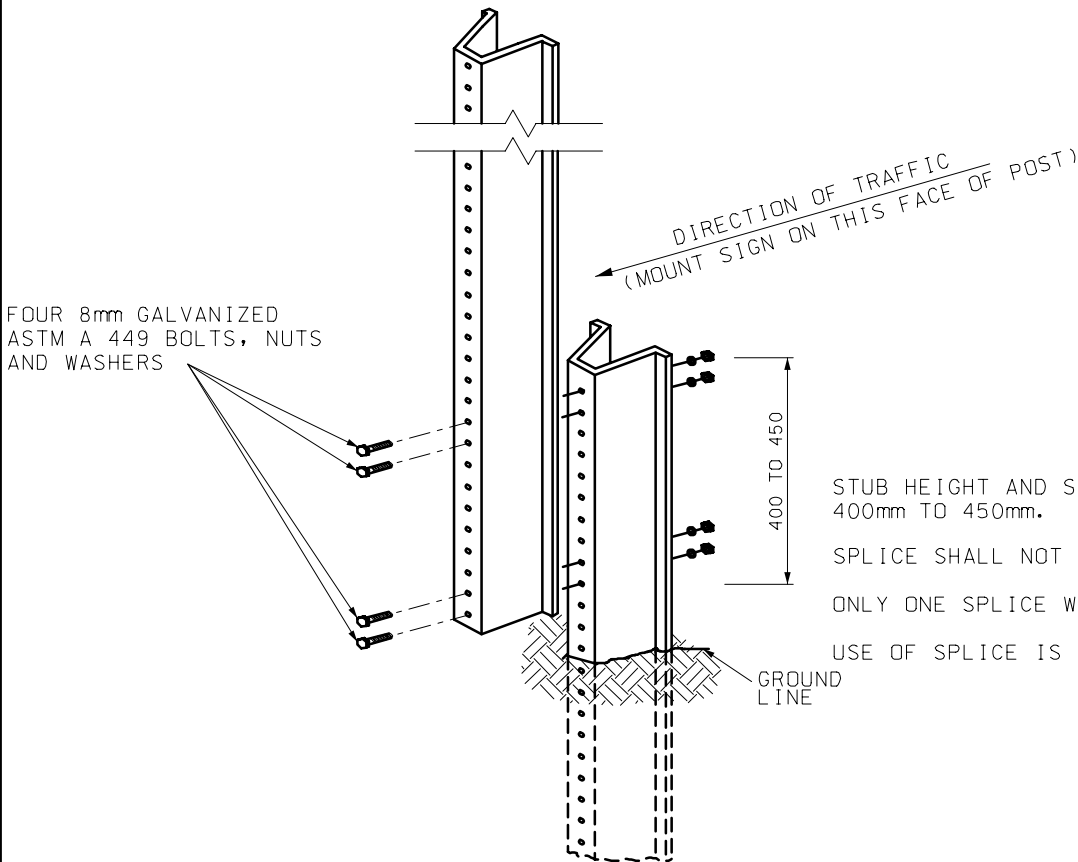
WOOD POST DETAIL

100 mm X 100 mm WOOD POST – NO SLOTS OR HOLE REQUIRED  
100 mm X 150 mm WOOD POST – 38 mm X 13 mm SLOT ON 150 mm SIDE  
OR 38 mm DIA. HOLE ON 150 mm SIDE  
150 mm X 150 mm WOOD POST – 50 mm X 13 mm SLOT OR 50 mm DIA. HOLE  
SLOT ACROSS NEUTRAL AXIS FORMED BY SUCCESSIVE  
DRILLING WITH 13 mm BIT.



THE SIGNPOST IS ATTACHED TO THE ANCHOR SLEEVE  
WITH THE CORNER BOLT PER MANUFACTURER'S  
SPECIFICATION.

PERFORATED SQUARE STEEL  
TUBE POST DETAIL



U-CHANNEL POST DETAIL

STUB HEIGHT AND SPLICE LAP SHALL BE  
400mm TO 450mm.  
SPLICE SHALL NOT EXTEND BELOW THE GROUND.  
ONLY ONE SPLICE WILL BE ALLOWED PER POST.  
USE OF SPLICE IS OPTIONAL.

SIGN AREA (SQ. m)	POST TYPE		
	U-CHANNEL	WOOD	PERF. SQUARE STEEL TUBING
≤ 0.90	1 – 4.5 kg/m*	1 – 100mm X 100mm*	1 – 50.8mm 12 GA.*
> 0.90 ≤ 1.44	2 – 4.5 kg/m	2 – 100mm X 100mm* 1 – 100mm X 150mm*	2 – 50.8mm 12 GA.
> 1.44 ≤ 2.16	2 – 4.5 kg/m	2 – 100mm X 150mm	3 – 50.8mm 12 GA.**
> 2.16 ≤ 2.70	3 – 4.5 kg/m	2 – 100mm X 150mm	N/A
> 2.70 ≤ 4.50	N/A	2 – 150mm X 150mm	N/A

\* SIGNS GREATER THAN 1.2m IN WIDTH, EXCEPT DIAMOND SHAPE SIGNS,  
REQUIRE TWO POSTS.  
\*\* REQUIRES SLIP BASE PER MANUFACTURER'S RECOMMENDATION.

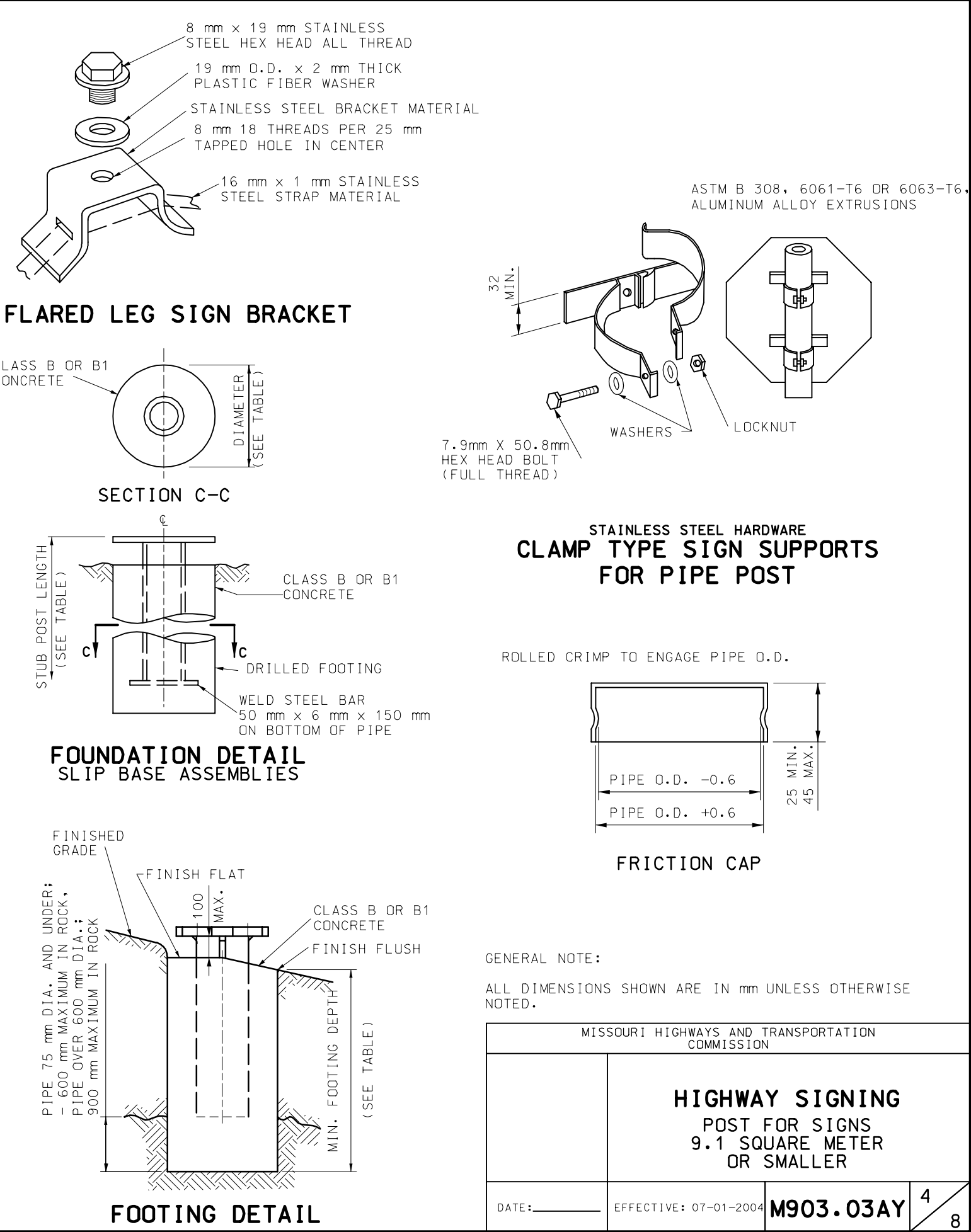
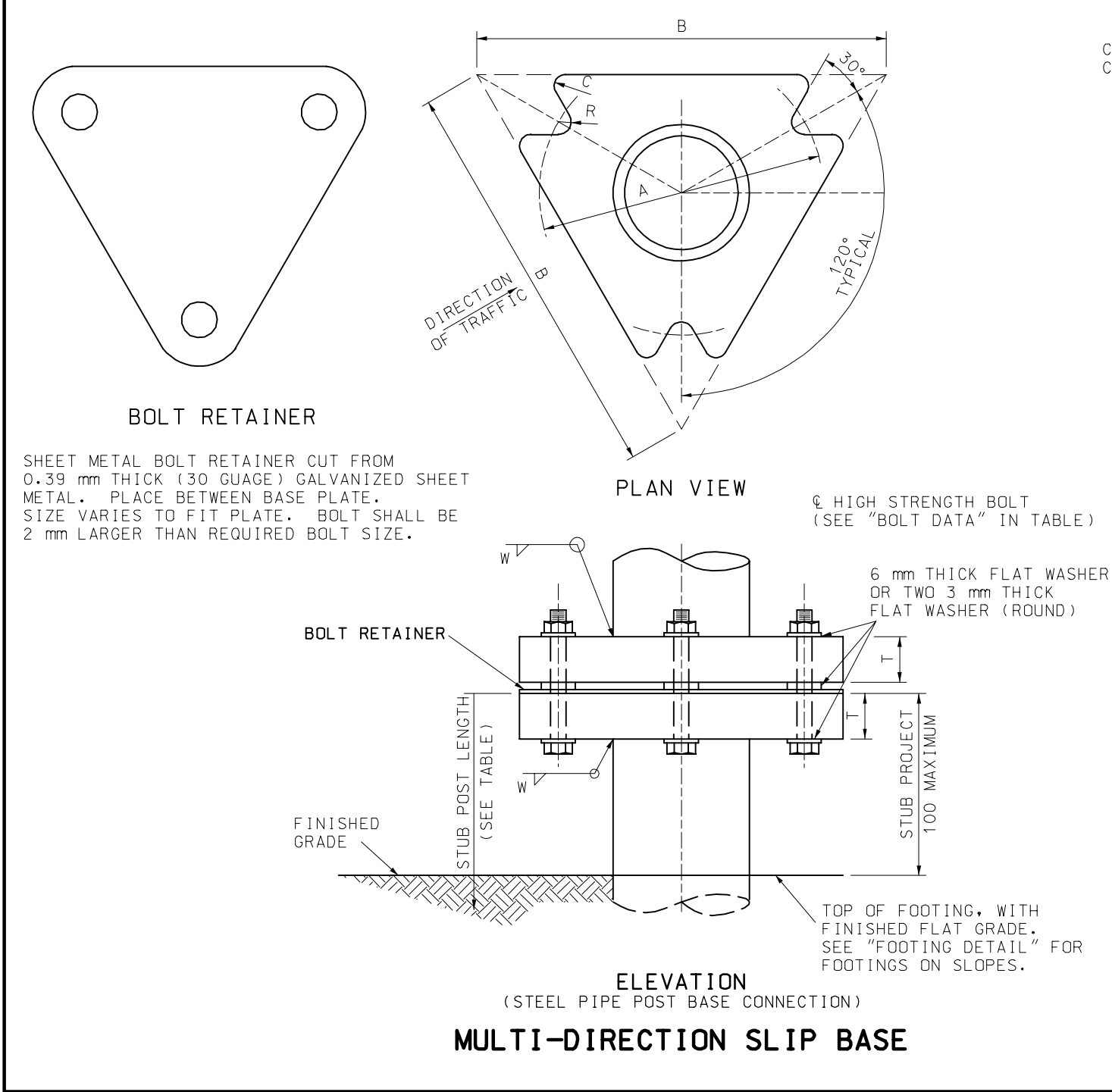
POST SIZE REQUIREMENTS

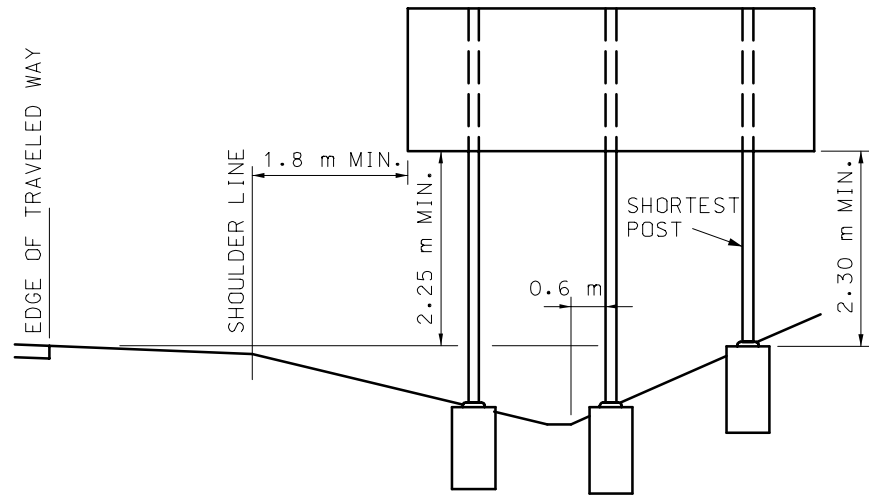
GENERAL NOTES:  
ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE  
NOTED.  
ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 910 cm.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
HIGHWAY SIGNING POST MOUNTING DETAILS			
DATE: _____	EFFECTIVE: 07-01-2004	M903.03AY	3 8

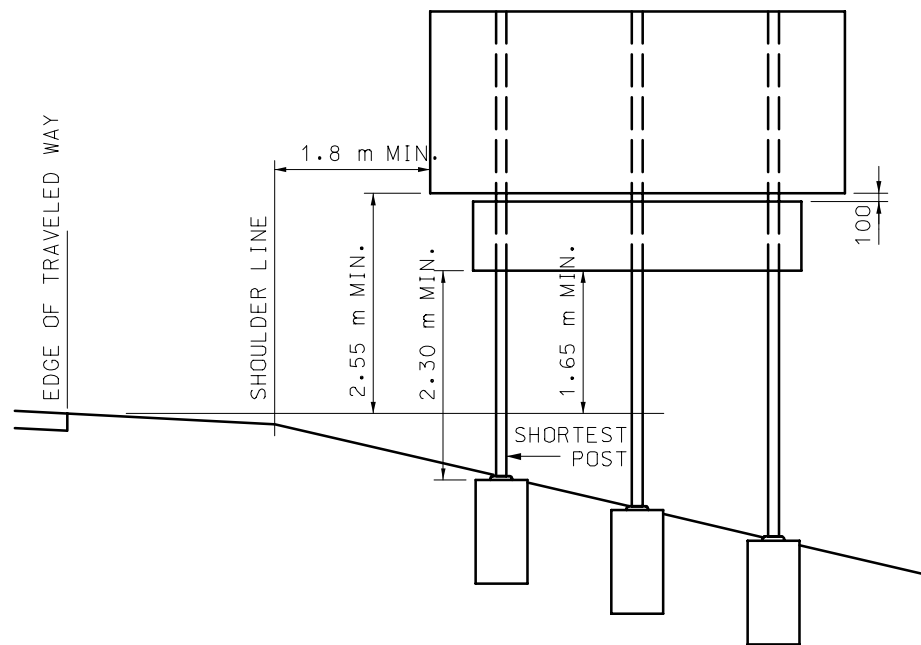
ROUND PIPE POST FOR GROUND MOUNTED SIGNS									
NOMINAL PIPE SIZE (mm)	BOLT DATA			BASE CONNECTION DATA TABLE (mm)					
	SIZE (mm)	LENGTH (IN.)	TORQUE Nm	A	B	C	R	T	W
65 & 75	13	90	15.8	159	229	6	7	25	6
100	16	95	39.0	183	254	6	10	25	8

ROUND PIPE POST AND FOOTING DATA TABLE					
NOM. SIZE (mm)	MASS kg/m	STUB LENGTH (mm)	FOOTING		CONCRETE (m³ /m)
			DIA. (mm)	DEPTH (mm)	
65	8.62	1005	305	1065	0.073
75	11.28	1310	305	1370	0.073
100	16.06	1615	460	1675	0.166

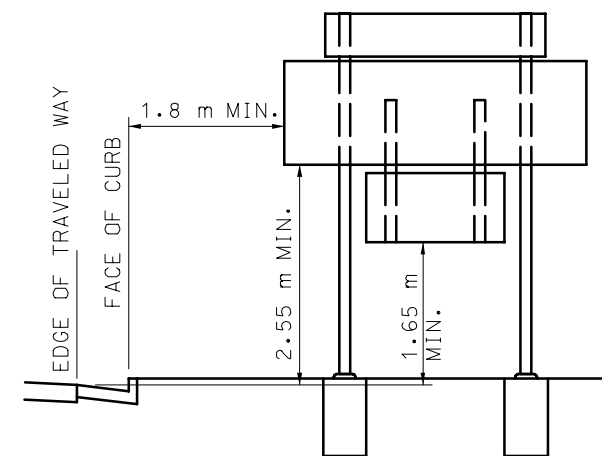




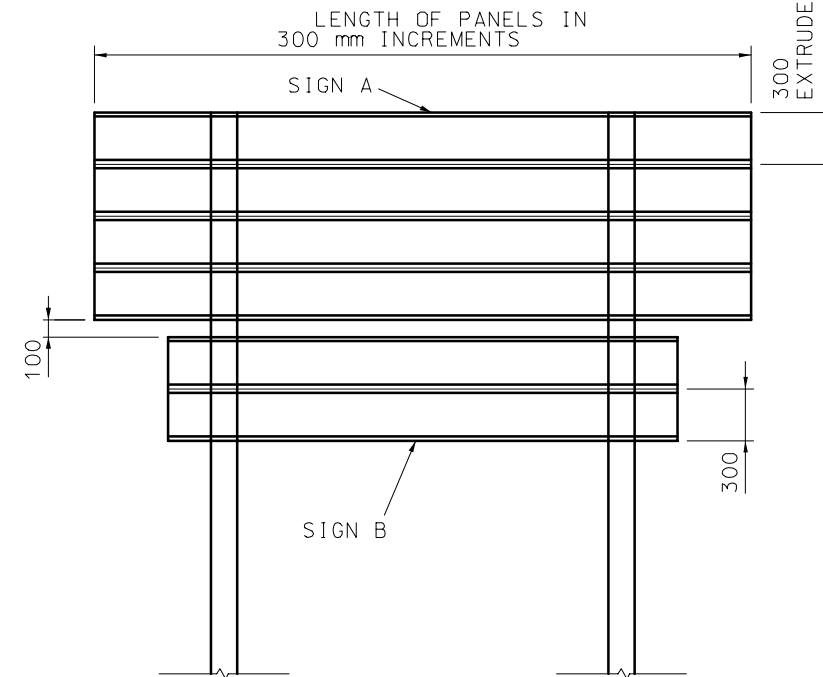
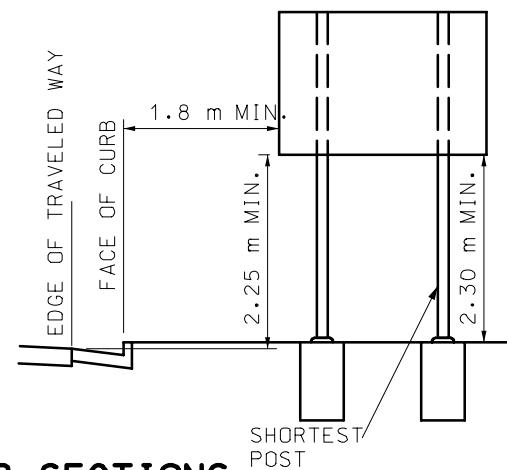
**DITCH SECTION**



**FILL SECTION**

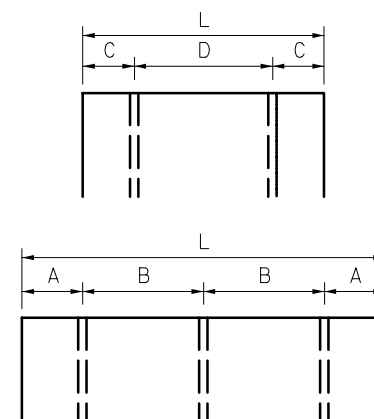


**BARRIER CURB SECTIONS**



SIGN B MAY BE MOUNTED ABOVE OR BELOW SIGN A AS REQUIRED.

**SIGN AND PANEL SPACING**

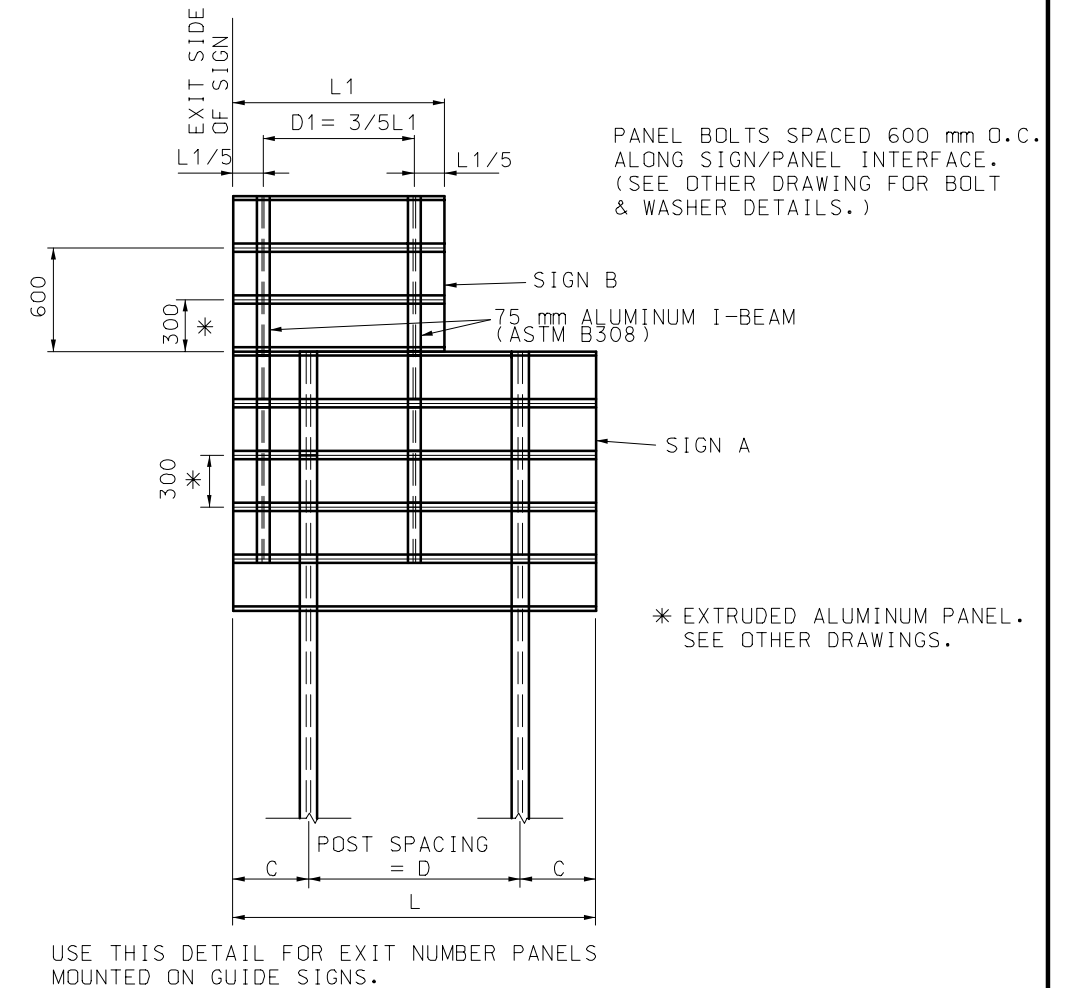


$$A = 1/6 \text{ LC} = 1/5 \text{ L}$$

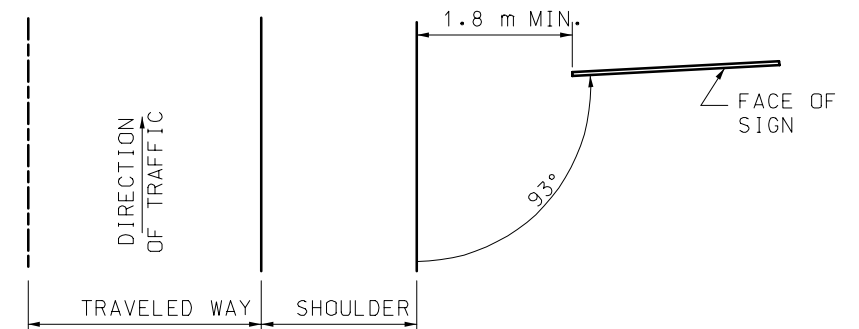
$$B = 1/3 \text{ LD} = 3/5 \text{ L}$$

**POST SPACING**

FOR L OF 1.8 m TO 5.1 m USE 2 POSTS.  
FOR L GREATER THAN 5.1 m USE 3 POSTS.  
FOR L LESS THAN 5.1 m, 3 POSTS MAY BE USED DEPENDING ON SOIL CONDITIONS.



USE THIS DETAIL FOR EXIT NUMBER PANELS MOUNTED ON GUIDE SIGNS.



**LOCATION SKETCH**

GENERAL NOTE:

ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE NOTED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
		<b>HIGHWAY SIGNING</b> TYPICAL SECTION AND POST SPACING	
DATE: _____	EFFECTIVE: 07-01-2004	<b>M903.03AY</b>	5
			8

## PANEL BOLT LOCATION

END ELEVATION

### POST CLIP DETAIL

DETAIL "C"

- ① SIGNS SHALL BE FIELD ATTACHED TO POSTS WITH POST CLIP AND BOLTS, SEE POST CLIP DETAIL. THE SHANK OF THE POST CLIP BOLT SHALL FIT TIGHTLY AGAINST THE POST FLANGE AFTER THE LOCKNUTS ARE TORQUED. LOCKNUTS ON THE POST CLIP BOLTS SHALL BE TORQUED TO 25.4 mm WHEN USING DRY, CLEAN, UNLUBRICATED THREADS.

PLAN VIEW

END VIEW

## 300 mm NOMINAL EXTRUDED ALUMINUM PANEL

MINIMUM MASS = 3.6 kg/m

NOTE:  
0.79 mm RADIUS ON ALL  
INSIDE AND OUTSIDE  
CORNERS, UNLESS  
SPECIFIED OTHERWISE.

NOTE:  
MINIMUM MASS AND THICKNESS DIMENSIONS SHOWN.  
HEAVIER PANELS MAY BE USED.

DETAIL "B"

ENLARGED DETAIL OF SERRATIONS  
SAW GATING AS SHOWN  
(APPROXIMATELY FLAT PERMISSABLE)

POST CLIP BOLT  
WITH FLAT WASHER AND LOCKNUT

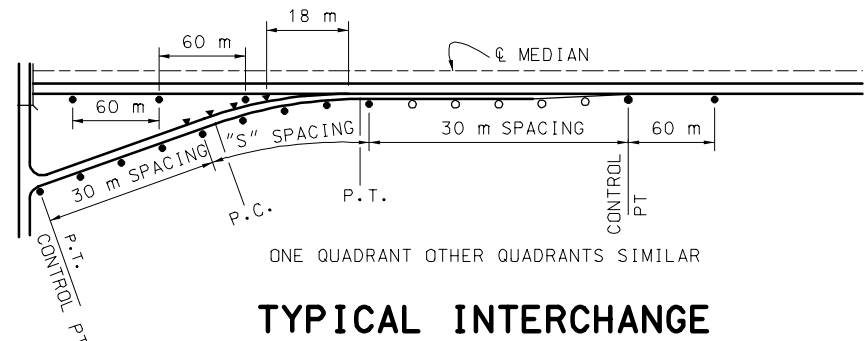
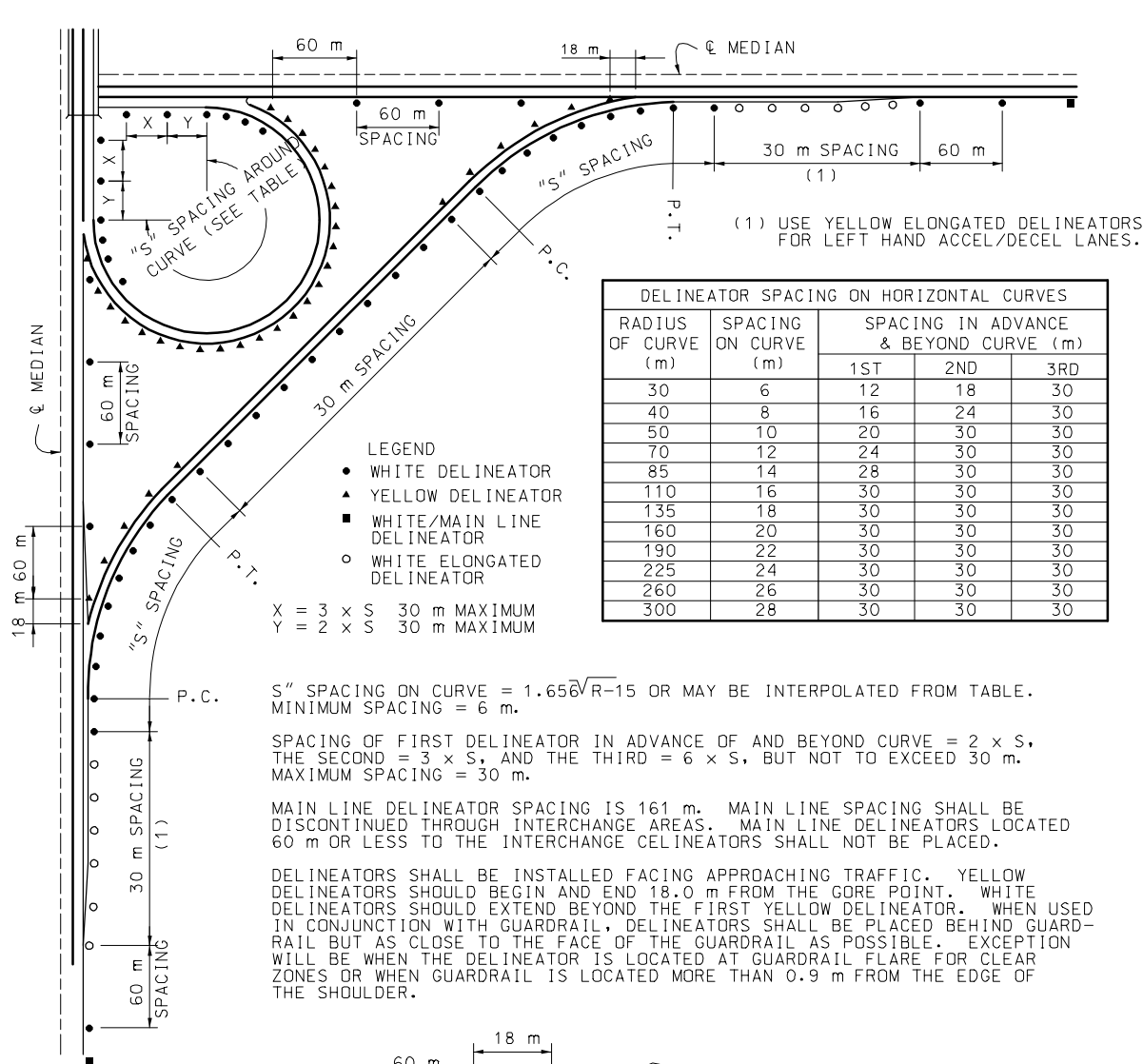
NOTE: SQUARE BOLT HEAD SHOWN.  
RECTANGULAR BOLT HEAD WITH  
LEAST DIMENSION OF 16 mm MAY  
BE USED.

BOLT - 45mm x 10 mm ALUMINUM  
HEX LOCKNUT - 10 mm ALUMINUM  
WASHER - ALUMINUM

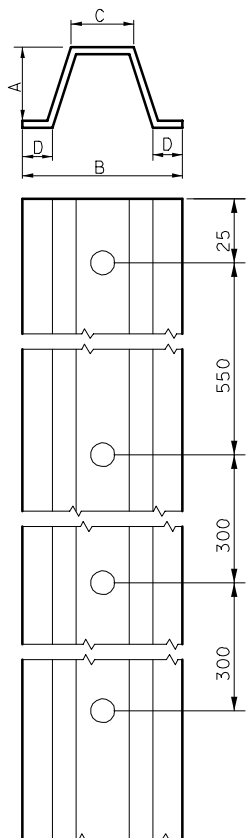
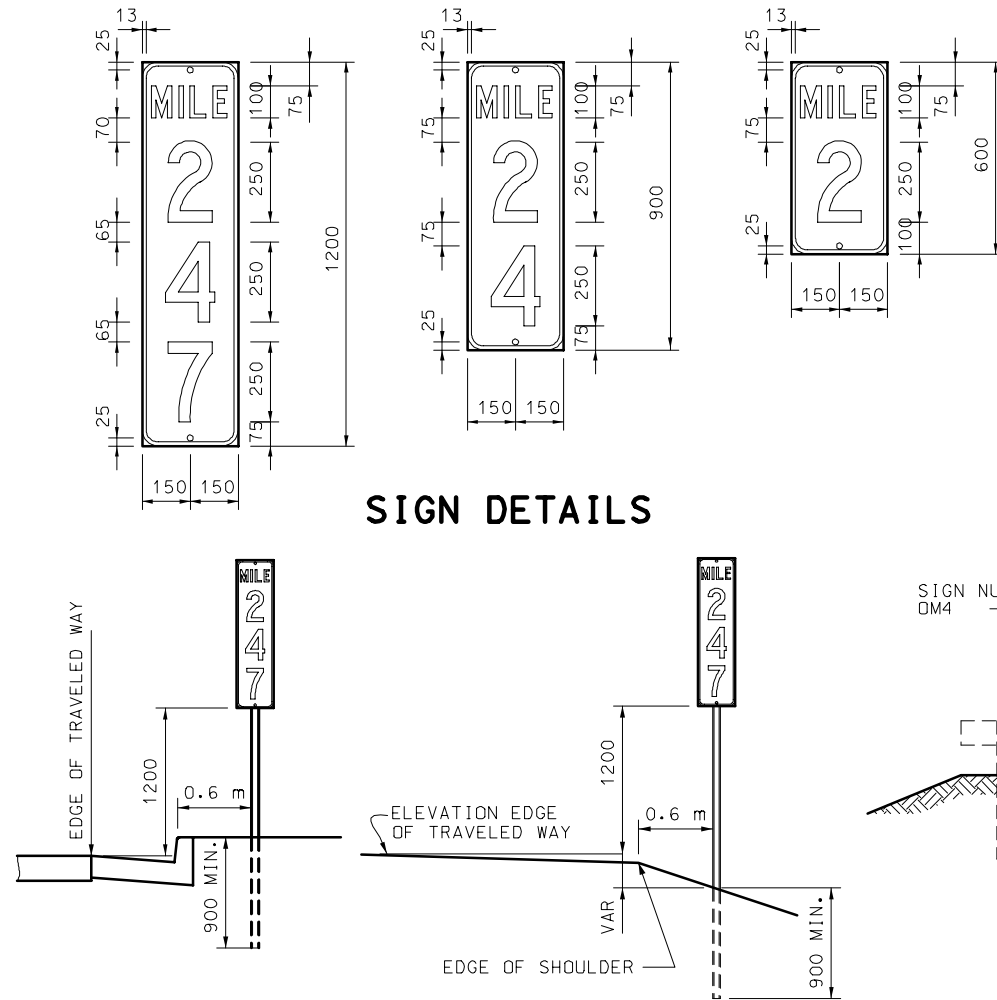
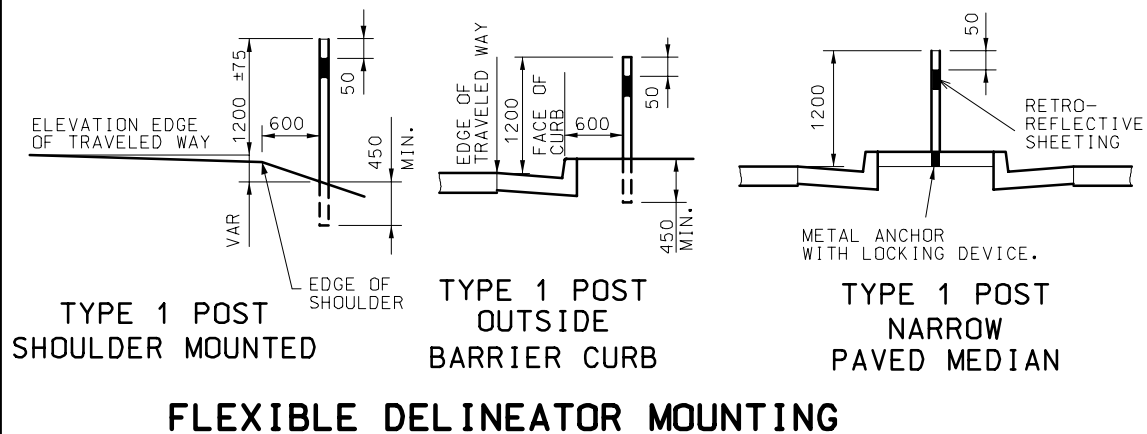
GENERAL NOTE:

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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
	<h1 style="text-align: center;">HIGHWAY SIGNING</h1> <h2 style="text-align: center;">EXTRUDED ALUMINUM PANEL DETAILS</h2>		
DATE: _____	EFFECTIVE: 07-01-2004	<b>M903.03AY</b>	6/8



TYPICAL INTERCHANGE



HOLE PUNCHING SHOWN IS THE MINIMUM NUMBER AND SPACING ALLOWED. THE MAXIMUM HOLE PUNCHING ALLOWED IS 10 mm DIAMETER HOLES, 25 mm CENTER TO CENTER, BEGINNING 25 mm FROM THE END AND CONTINUING THE ENTIRE LENGTH OF THE POST.

VANDAL PROOF BOLT AS APPROVED BY THE ENGINEER.

LIMITS	kg/m (3)	DIMENSIONS - mm			
		A	B	C	D
MIN.	2.68	32	64	25	12
MAX.	3.35	41	83	32	18

(3) MASS BEFORE GALVANIZING OR PUNCHING. LIMITS SHOWN ARE ABSOLUTE. NO FURTHER WEIGHT, DIMENSIONAL OR COMMERCIAL TOLERANCE WILL BE ACCEPTABLE.

MILE AND OBJECT MARKER POST AND FASTENER DETAILS

GENERAL SIGN DATA				
SHR2L-1*	TYPE	REFLECTIVE SHEETING TYPE	COLOR	LETTER SERIES
SHR2L-3	L-1* OR L-3	R2	GREEN	
BACKGROUND	L-1* OR L-3	R4**	WHITE	C
LEGEND				
SYMBOLS				
BORDER	L-1* OR L-3	R4**	WHITE	
SUBSTRATE	SHEET			

\* REVERSE SCREENED.  
 \*\* IF L-3 IS USED.

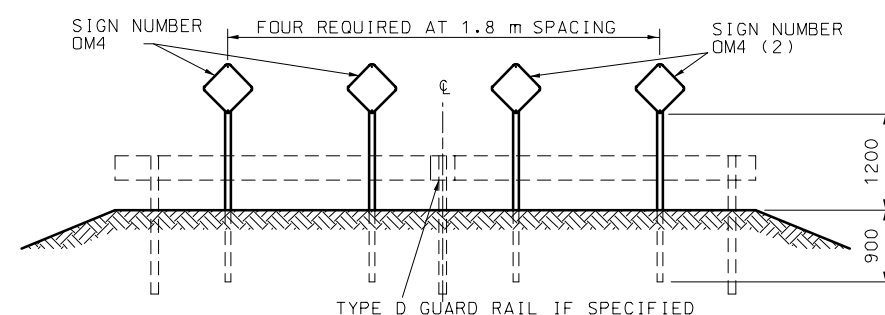
LEGEND, SYMBOLS & BORDER

L-1 SCREEN PRINT, REVERSE SCREEN PRINT, OR OPAQUE OR TRANSLUCENT CUTABLE FILMS AS APPROVED BY ENGINEER BASED ON SIGN COLOR COMBINATION.

L-3 DIRECT APPLIED (CUT FROM MATERIAL SHOWN ON PLANS.)

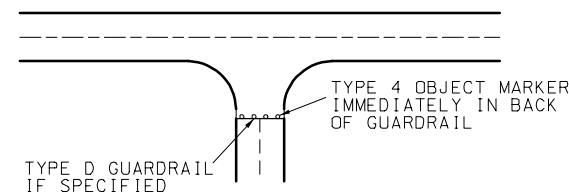
BACKGROUND REFLECTIVE SHEETING

R2 REFER TO MISSOURI SPECIFICATION SECTION 1042 TYPE 3  
 R4 REFER TO MISSOURI SPECIFICATION SECTION 1042 TYPE 7



MOUNTING DETAILS  
 (END OF ROAD OR STREET)  
 TYPE 4 OBJECT MARKER SIGN OM4

(2) RED MODOT TYPE 7 REFLECTIVE SHEETING ON 1.5 mm SHEET ALUMINUM.



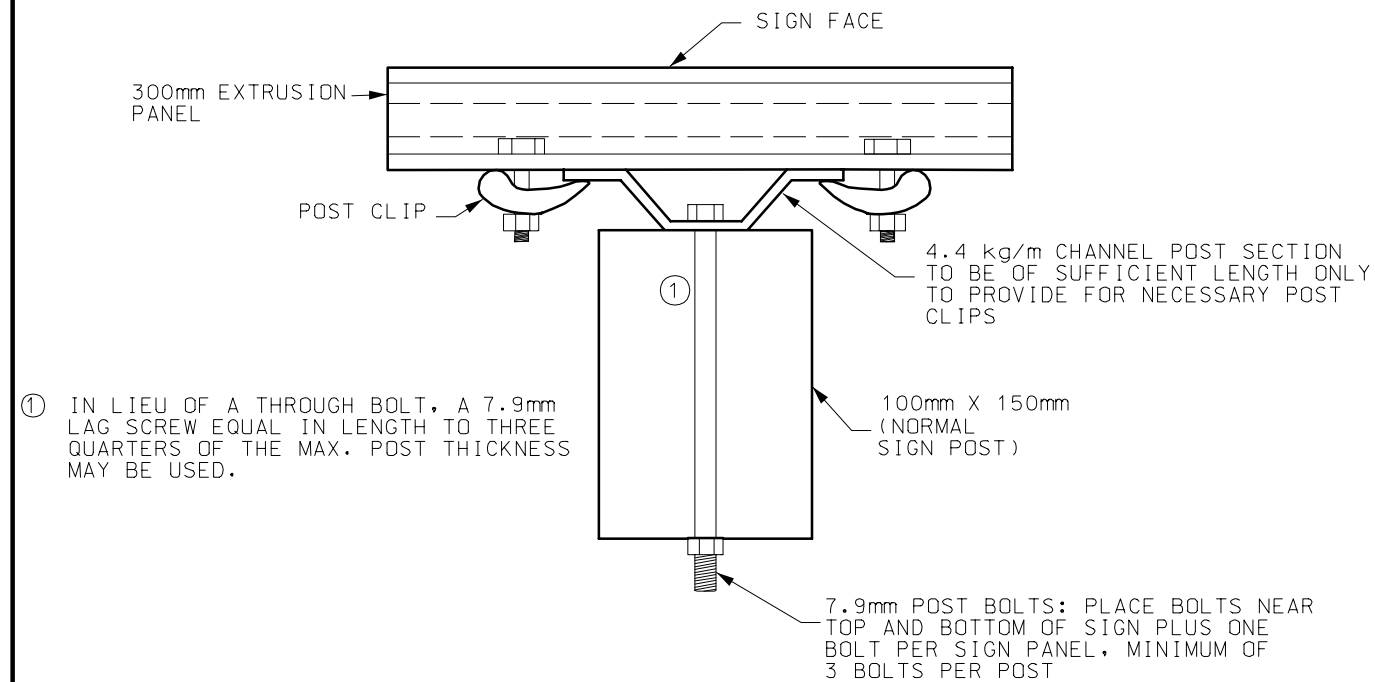
TYPICAL ROAD CLOSED

GENERAL NOTES:

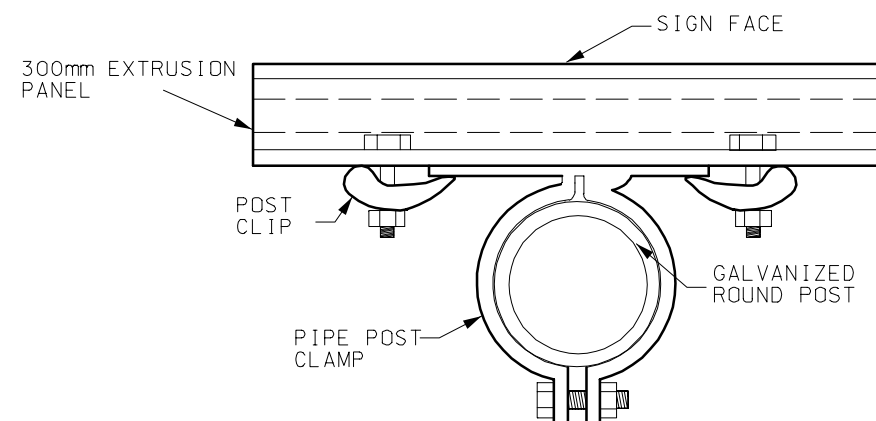
ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE NOTED.

THE CONTRACT UNIT PRICE FOR EACH MILE MARKER AND TYPE 4 OBJECT MARKER SHALL INCLUDE SIGN PANEL, REFLECTIVE SHEETING, AND POST, REGARDLESS OF LENGTH.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
HIGHWAY SIGNING DELINEATORS, MILE MARKERS AND OBJECT MARKERS			
DATE: _____	EFFECTIVE: 07-01-2004	M903.03AY	7/8

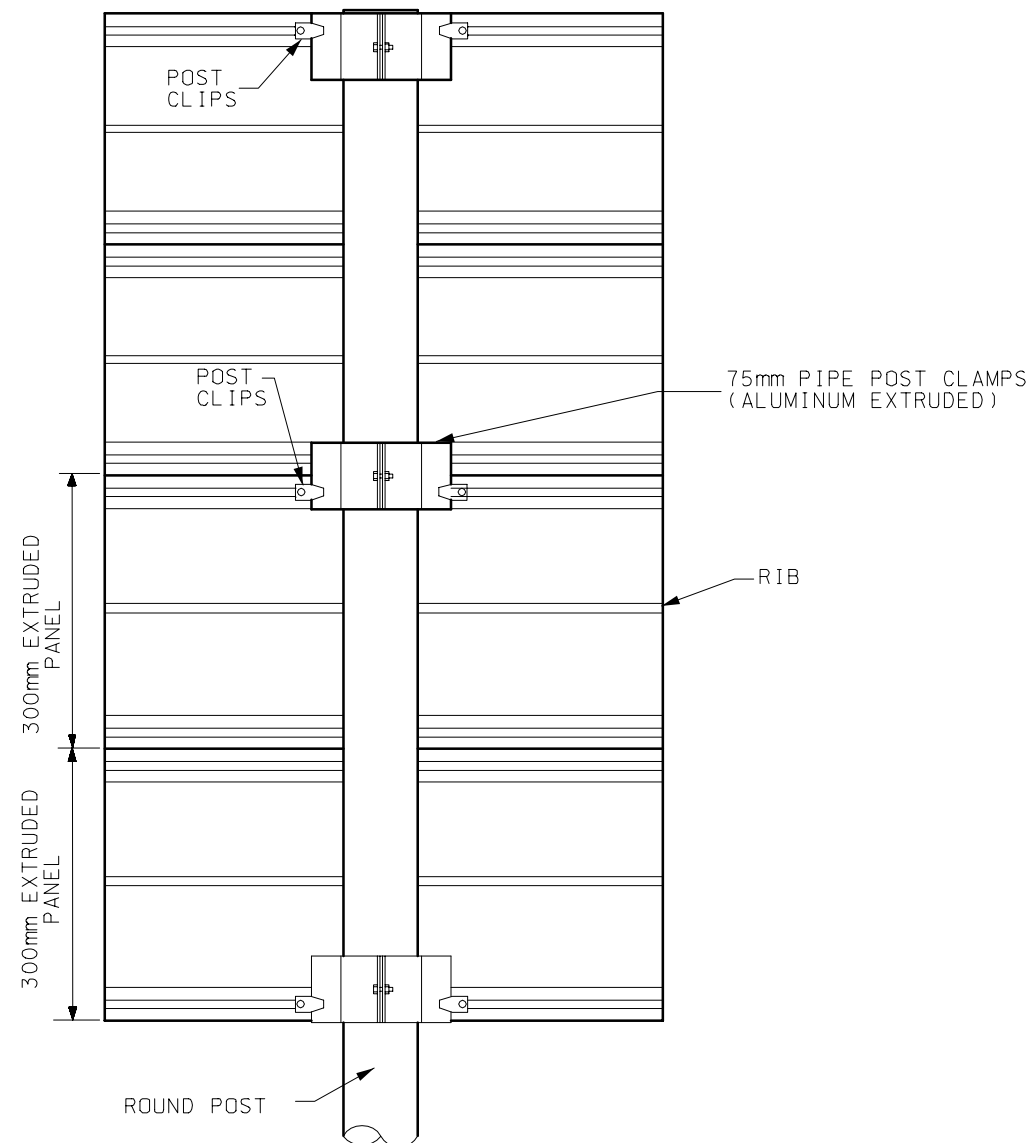


PLAN VIEW  
MOUNTING DETAILS FOR EXTRUDED  
PANELS ON WOOD 100mm X 150mm POST

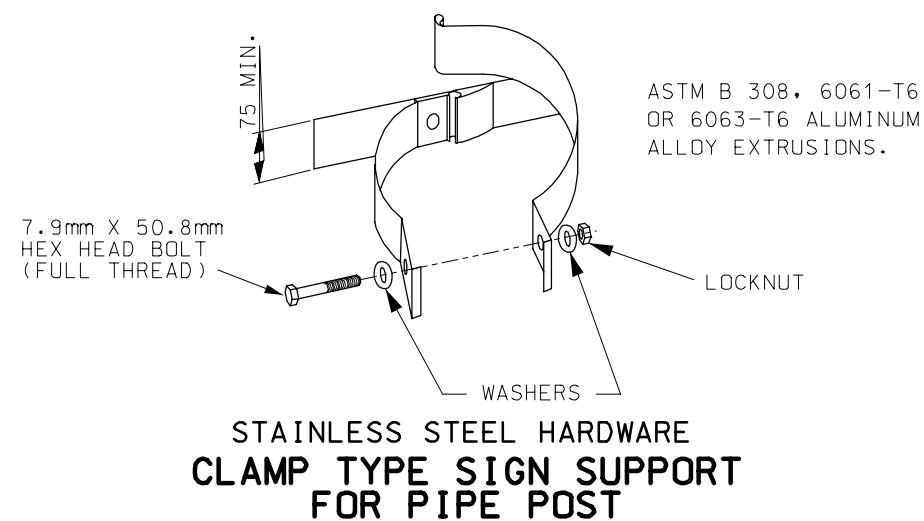


PLAN VIEW  
MOUNTING DETAILS FOR EXTRUDED PANELS  
ON ROUND PIPE POST

NUMBER OF BOLTS TO ATTACH STEEL CHANNEL TO WOOD POST	
SIGN HEIGHT (mm)	NO. OF BOLTS* PER WOOD POST USED
300	2
600	3
900	4
1200	5
1500	6
1800	7
2100	8
*LAG SCREWS MAY BE SUBSTITUTED	



TYPICAL POST CLIP MOUNTING DETAILS  
FOR ROUND PIPE POSTS



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
		HIGHWAY SIGNING EXTRUDED PANEL ATTACHMENTS FOR SIGNS 2.8 m <sup>2</sup> OR SMALLER	
DATE: _____	EFFECTIVE: 07-01-2004	M903.03AY	8/8